CAVE BAY COMMUNITY SERVICES
SOURCE WATER ASSESSMENT REPORT

December 19, 2000

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with well and aquifer characteristics.

This report, *Source Water Assessment for Cave Bay Community Services* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment, taken into account with local knowledge and concerns, should be used as a planning tool to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The Cave Bay Community Services drinking water system consists of two wells. Because the wells are only about 50 feet apart they are considered a well field drawing from a single source. The wells are moderately susceptible to contamination from inorganic chemicals (IOCs), volatile organic chemicals (VOCs), synthetic organic chemicals (SOCs) and microbials. Coliform bacteria have been present in water samples from Cave Bay Community Services well field on several occasions. While the microbial contamination appears to have been related to the distribution system rather than aquifer itself, further evaluation of the well field's vulnerability to microbial contamination is needed considering the location of the well field near the lake, the sewer line buried in the road near the wells, and seasonal storm water draining between the wells.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

One of the top priorities for Cave Bay Community Services should be diversion of storm water at least 50 feet from the wells. A cross connection prevention plan should be developed to prevent contamination of the water supply through the distribution system. Partnerships with state, local, and tribal agencies and industry groups should be established. Source water protection activities related to agriculture, for example, should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission and local Soil Conservation District. Due to the time involved with the movement of groundwater, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. For assistance in developing protection strategies please contact your regional IDEQ office or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR CAVE BAY COMMUNITY SERVICES

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is attached.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment, taken into account with local knowledge and concerns, should be used as a planning tool to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (IDEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. IDEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Figure 1. Geographic Location of Cave Bay Community Services

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Cave Bay Community Services water system serves a population of approximately 200 people. The community is located east of Worley, Idaho on the Coeur d'Alene Indian Reservation and the western shore of Lake Coeur d'Alene (Figure 1). Public drinking water for Cave Bay Community Services comes from a well field comprised of two wells drawing from a confined Columbia River Basalt aquifer.

The Cave Bay Community Services wells have had few historical water quality problems. IDEQ has granted the system waivers from monitoring for VOCs and most SOCs through December 2001. Recurrent bacterial contamination of water samples from the well field appears to be associated with distribution system problems. Never the less the well field needs to be further evaluated to see whether the source is ground water under direct influence of surface water (GWUDI).

Defining the Zones of Contribution--Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time of travel zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. IDEQ used a refined computer model developed by the USGS and approved by the EPA in determining the 3-, 6-, and 10- year time of travel for water associated with the aquifer system which encompasses Cave Bay Community Services wells. The computer model used site specific data, assimilated by IDEQ from a variety of sources including the Cave Bay Community Services and other local well logs. The delineated source water assessment area for Cave Bay Community Services is roughly elliptical. It stretches southwest from the wells for about 1.75 miles. The maximum width is about 0.4 miles. Data used by IDEQ in determining the source water assessment delineation area are available upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by IDEQ and from available databases.

The dominant land use in the vicinity of Cave Bay Community Services is undeveloped woodland. The residential community is on the shore of Lake Coeur d'Alene. Houses in the community are connected to a sewage system with a lagoon about 0.3 miles west of the Cave Bay Community Services wells and outside the source water protection area. Sewer lines leading to the lagoon cross the protection area within 200 feet of the well field.

It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination. These involve educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

DEQ conducted a two-phased contaminant inventory of the study area. The first phase involved identifying and documenting potential contaminant sources within the Cave Bay Community Services Source Water Assessment Area through the use of computer databases and Geographic Information System (GIS) maps developed by IDEQ. The second or enhanced phase of the contaminant inventory involved local efforts to identify additional potential sources and validate sources identified in phase one. This task was undertaken with the assistance Keith Drake.

Potential contaminant sites identified within the delineated source water area include boat docks, roads crossing the protection area, and a small area of dry land agriculture (see Figure 2). The public water system file for Cave Bay Community services also documents the presence of a sewer line within 200 feet of the well field, and seasonal storm water flowing between the wells. Table 1 summarizes the potential contaminant inventory for Cave Bay Community Services.

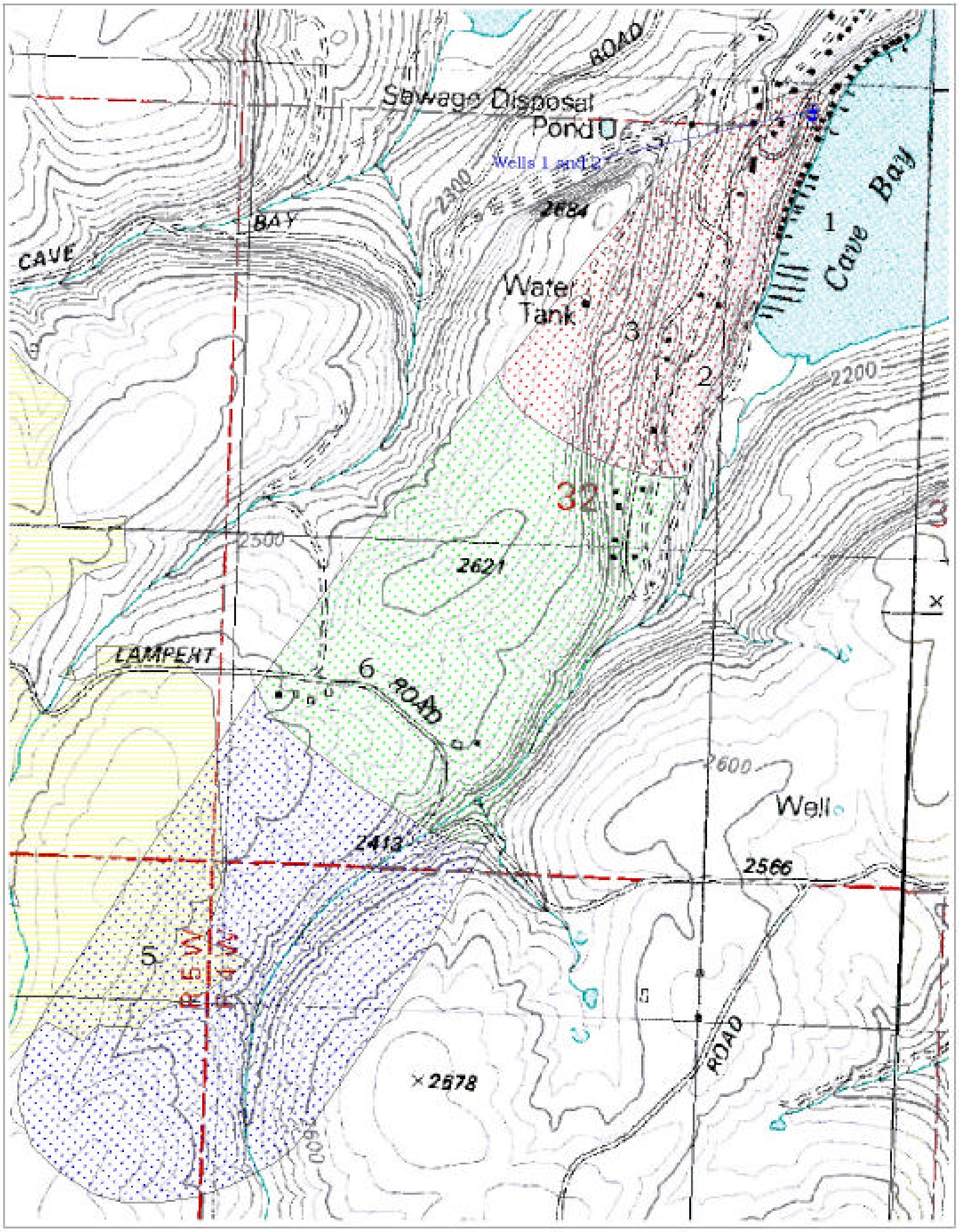

Figure 2
Cave Bay Community Services
Delineation Map and Contaminant Sources

LEGEND

Time of Travel Zones
3 YR
6 YR
10 YR
Wellhead
Enhanced Inventory Coverage

Agricultural Landuse
Agriculture, CRP or Fallow
Agriculture, Undetermined
Disturbed
Dry Land Agriculture
Irrigated Agriculture
Urban or Residential

N

This computer representation has been developed by DEQ from sources which have supplied data or information that has not been verified by DEQ. DEQ does not support its use for commercial purposes without verification by an independent professional qualified to verify such data or information. DEQ shall not be held liable for any loss or injury resulting from reliance upon the information shown. Coeur d'Alene Regional Office technical staff and State DEQ Technical Services staff were instrumental in developing this map.

Table 1. Cave Bay Community Services Potential Contaminant Inventory

MAPID	NAME	TOT[1] Zone (years)	Source of Information	Potential Contaminants[2]
*	Seasonal Storm Water Run off	Sanitary Setback	Public Water System File	SOC, VOC, IOC Microbial
*	Sewer Line	3 YR	Public Water System File	IOC, Microbial
1	BOAT DOCKS	3 YR	Enhanced Inventory	IOC, SOC,VOC
2	ROADS	3 YR	Enhanced Inventory	IOC, SOC, VOC
3	ROADS	6 YR	Enhanced Inventory	IOC, SOC, VOC
4	ROADS	6 YR	Enhanced Inventory	IOC, SOC, VOC
5	DRYLAND AGRICULTURE	10 YR	Enhanced Inventory	IOC, SOC
6	ROADS	10 YR	Enhanced Inventory	IOC, SOC, VOC

*Exact location not known.

1. TOT = Time of Travel
2. SOC= Synthetic Organic Chemical. VOC = Volatile Organic Chemical. IOC = Inorganic Chemical. Contaminant

Section 3. Susceptibility Analysis

Significant potential sources of contamination were ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristic, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking. The Susceptibility Analysis Worksheet for Cave bay Community Services is on page 15 of this report.

Well Construction

Construction details directly affect a well's ability to protect the aquifer from surface and subsurface contaminants. The susceptibility analysis assigns up to 6 points for well construction factors with lower scores implying a system better able to safeguard the aquifer. The well construction score for the Cave Bay community Services well field is 4.

A November 2000 sanitary survey indicates both wellheads and surface seals are maintained adequately. The wells are outside the 100 year flood plain for the lake though they are less than 200 feet from the shore. Surface seal details usually found on the well logs are not documented for either well, so it is not known whether the seals extend to the required depth.
Details about the casing thickness for both wells, and the casing depth for Well #1 are not recorded on the available well logs for Cave Bay Community Services. Current Idaho Department of Water Resources standards require public water system wells to conform with the Recommended Standards for Water Works (1997). Among other regulations, the standards call for a thickness of 0.28 inches for a 6-inch diameter casing.

Copies of Idaho Drinking Water Rules and Idaho Department of Water Resources Well Construction Standards are available at the web sites listed in the electronic references.

The wells in the Cave Bay Community Services system are 330 and 147 feet deep, with static water levels 70 feet below ground level for Well #1 and 65 feet for Well #2. It is not possible to tell whether the highest production levels of the wells are more than 100 feet below static water levels with available information.

Hydrologic Sensitivity

Hydrologic sensitivity indicates the relative ease with which surface or subsurface water can migrate toward a well. It includes intrinsic geologic characteristics of the saturated and unsaturated zones. The hydrologic sensitivity score for the Cave Bay Community Services well field is 3. The well log for the original well is not on file with DEQ, but because the wells are so close together, the protective clay and sand layers documented for Well #2 are assumed to extend over the Well #1 location.

The National Resource Conservation Service soil drainage classification for the source water assessment area taken as a whole is "moderately to well drained". Soils in this classification provide less protection to the groundwater than soils that drain more slowly. Well logs for Cave Bay Community services show that the water table is less than 300 feet below ground level, another factor contributing to hydrologic sensitivity.

Potential Contaminant Source and Land Use

The current type and amount of agricultural land use documented in the Cave Bay Community Services source water assessment area is not a concern for ground water quality. Points were added to this portion of the susceptibility analysis based on the number of potential contaminant sites and leachability characteristics of individual classes of contaminants. The Susceptibility Analysis Worksheet on page 14 of this report shows the points accumulated for each class of contaminant in each of the time-of- travel zones. Higher susceptibility scores are assigned potential contaminant sites closer to the well than to sites further from the well as defined by the time-of-travel zones.

Susceptibility Summary

The final ranking for the well field combines hydrologic sensitivity, system construction and land use/potential contaminant factors. With all factors considered, the Cave Bay Community Services well field ranks at moderate risk to IOC, SOC, VOC and Microbial contamination. Table 2 summarizes the results of the susceptibility analysis for the system.

The three factors that contribute to the susceptibility rating for a ground water system (hydrologic sensitivity, land use with associated potential contaminant sources, and well construction integrity) are considered to have equal importance in the susceptibility rating.

However, the susceptibility analysis has the tendency to allocate many more points to the land use and potential contaminant source factor (30 points possible) when compared to the hydrologic sensitivity and the well construction integrity factors (each with six points possible). For this reason, the numerical scores associated with land use and potential contaminant factors are normalized. The final scores for the susceptibility analysis are determined using the following formulas:

1. VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
2. Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375).

Table 2. Summary of Cave Bay Community Services Susceptibility Evaluation

Source: Wellfield	**Contaminant Categories**			
	IOC	**VOC**	**SOC**	**Microbial**
System Construction Score	4	4	4	4
Hydrologic Sensitivity Score	3	3	3	3
Cumulative Potential Contaminant/Land Use Score X 0.2 (VOC/SOC/IOC)	3	3	3	
Cumulative Potential Contaminant/Land Use Score X 0.375 (Microbial)				2
Total	10	10	10	9
Final Well Ranking	**Moderate**	**Moderate**	**Moderate**	**Moderate**

IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
High* - Indicates source automatically scored as high susceptibility due to the presence of total coliform bacteria or a VOC, SOC or an IOC above the Maximum Contaminant Level in the finished drinking water.

Final Susceptibility Ranking:
0 - 5 Low Susceptibility
6 - 12 Moderate Susceptibility
> 13 High Susceptibility

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective source water protection program is tailored to the particular local source water protection area. A community with a fully developed source water protection program will incorporate many strategies. For Cave Bay Community Services source water protection activities should focus on preserving current water quality.

First, seasonal storm water drainage, a potential carrier of all classes of contaminants, needs to be diverted away from the wells. The system should also develop a cross connection prevention program.

Public education regarding the location of the source water protection zone; proper use and disposal of household chemicals; and cross connection prevention for all users of the water system are additional ideas you may wish to implement. County zoning ordinances, leases, and easements can be useful tools for regulating land use over the source water protection zone. Partnerships with state and local agencies and the Coeur d'Alene Indian Tribe should be established. Due to the time involved with the movement of groundwater, wellhead protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term.

Assistance

Public water supplies and others may call the following IDEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the IDEQ office for preliminary review and comments.

Coeur d'Alene Regional IDEQ Office (208) 373-0550

State IDEQ Office (208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at (208) 343-7001 for assistance with wellhead protection strategies.

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Attachment A

Cave Bay Community Services
Susceptibility Analysis
Worksheets

Ground Water Susceptibility Analysis Worksheet

Public Water System Name : **CAVE BAY COMMUNITY SYSTEM** Source: **Wellfield**

Public Water System Number : **1280041** 12/18/00 10:39:43 AM

1. System Construction		SCORE			
Drill Date	Well #2, 4/4/66. Well #1, unknown. Well deepened in 1993.				
Driller Log Available	Well #2, yes. Well #1. Log for deepening well in 1993 on file.				
Sanitary Survey (if yes, indicate date of last survey)	YES	Nov-2000			
Well meets IDWR construction standards	Unknown	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	Seal depth unknown	2			
Highest production 100 feet below static water level	Unknown	0			
Well located outside the 100 year flood plain	YES	1			
Total System Construction Score		**4**			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	NO	0			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	YES	0			
Total Hydrologic Score		**3**			
		IOC	VOC	SOC	Microbia
3. Potential Contaminant / Land Use - ZONE 1A (Sanitary Setback)		Score	Score	Score	Score
Land Use Zone 1A	Other	0	0	0	0
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		**0**	**0**	**0**	**0**
Potential Contaminant / Land Use - ZONE 1B (3 YR. TOT)					
Contaminant sources present (Number of Sources)	YES	4	3	3	2
(Score = # Sources X 2) 8 Points Maximum		8	6	6	4
Sources of Class II or III leacheable contaminants or Microbials	YES	4	3	3	
4 Points Maximum		4	3	3	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		**12**	**9**	**9**	**4**
Potential Contaminant / Land Use - ZONE II (6 YR. TOT)					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or Microbials	YES	1	1	1	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		**3**	**3**	**3**	**0**
Potential Contaminant / Land Use - ZONE III 10 YR. TOT)					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or Microbials	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of Zone	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		**2**	**2**	**2**	**0**
Cumulative Potential Contaminant / Land Use Score		**17**	**14**	**14**	**4**
4. Final Susceptibility Source Score		**10**	**10**	**10**	**9**
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund@ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.